BACK-UP Slides

Fabrication / Quality Control

- Piece part inspection of hardware at time of receipt
- Operators qualified / certified
  - Soldering
  - Surface Mount Technology
  - Crimping, Cable, Harness, and Wiring
  - Fiber Optics
  - Staking, Potting, Conformal Coating
  - ESD
- Processes defined and documented (including non-standard processes)
  - Non-standard processes shall include special inspection instructions and techniques
  - Qualification or demonstration shall be addressed for each special process
- Inspections inserted at the correct fabrication points

Inspection Points

- **Incoming Piece Part (Electrical / Mechanical)**
  - Review procurement document for proper requirements
    - Is source inspection required / necessary
    - Verify pure tin is not being used
    - Are the correct requirements imposed
  - Perform receiving inspection
    - Verify data per procurement call outs and receiving plan
    - Perform test data review
    - Perform piece part inspection (per plan or mfg. requirements)
    - Test, if required
    - Visual (4X — l0X) / Typical
    - Is additional testing or screening required
    - Bag and tag hardware (flight)

Inspection Points

- **CCA Inspection**
  - PWB coupon analysis performed
    - GSFC or approved lab
  - Kit Pull Verification / Inspection (items required for flight assembly)
    - Traceability
    - Damage
  - Assembly Inspection (In-process)
  - PWB pre-baked
  - Verify that any inspections that are inaccessible later, are performed real time
  - Post Solder (100% inspection)
  - Verify as built vs. as design
  - Post open-frame, card test handling damage and data review

Inspection Points

- CCA Inspection cont'd
  - Pre conformal coating / staking
  - Post conformal coating
    - Verify Witness Sample (cure /shore hardness)
    - Control Specimen (coated concurrently with regular operation)
    - UV (Black Light) Inspection
    - 4X-10X Inspection Performed
- Harness Fabrication Inspection
  - Kit Pull Verification / Inspection (items required for flight assembly)
    - Traceability
    - Damage

Inspection Points

- **Harness Fabrication Inspection cont'd**
  - **Assembly inspection (in-process)**
    - **Crimp inspections (100 %)**
    - **Crimp pull test (am / pm)**
    - **Solder inspection (100 %)**
      - **Solder Cups**
      - **Solder Shields**
      - **Raychem' s (Solder Sleeves)**
    - **Shrink tubing**
    - **Stress relief, cable ties, routing**
    - **Potting (includes shore hardness check)**
      - **Witness Sample (cure/shore hardness)**
    - **As built vs. as design**
    - **Marking / Identification**

Inspection Points

- **Harness Fabrication Inspection cont'd**
  - **Test**
    - **Continuity**
    - **IR / Hypot (Insulation Resistance/Dielectric Withstanding Voltage), Reference NASA-STD-8739.4**
    - **Special test considerations**
- **Component / Subsystem / Inspections**
  - **Kit Pull Verification / Inspection (items required for flight assembly)**
    - **Traceability**
    - **Damage**

Inspection Points

- **Component / Subsystem / Inspections cont'd**
  - **Witness Assembly**
    - **Follow print**
    - **Verify torque**
    - **Verify locking applications (Uralane, etc.)**
    - **As built vs. as design**
    - **Markings per print**
    - **Photographs of the individual CCAs (front and back) and closure**
  - **Pre Test Review**
    - **Manufacture Test and Inspection Logs (lower level)**
    - **Open Items**
    - **Anomaly Reports and disposition**
    - **Identify all Constraints**

Inspection Points

- **Component / Subsystem / Inspections cont'd**
  - **Test inspection (in-process)**
    - **Verify procedure approved for use**
    - **Verify Ground Support Equipment (GSE) is acceptable for flight use**
      - **When interfacing with flight hardware, interfaces shall be of flight quality**
    - **Calibration of all support equipment current and will not expire prior to test completion**
    - **Connector savers being utilized**
      - **Procedures should detail when and when not acceptable for use**
    - **Witness set-ups and critical test**
    - **Perform data reviews throughout acceptance test program**
    - **Perform inspections pre/post environments and moves**
    - **Perform final acceptance test data review / inspection**

Typical Source Inspections

- Precap visuals when deemed necessary
- Post solder / pre conformal coating
- Pre closure when deemed necessary
- Post test acceptance data review / pre-ship inspection

Test Program

- Accumulate significant mission specific test time
  - Thermal Environments
  - Failure free hours of operation
  - Minimum hours of operation
- Verify as built hardware meets designer's requirements in the intended application
- Allow sufficient test time to find infant mortality failures
  - Unpowered thermal cycles at lower levels (assembly level)
- Trend data
- Review test data prior to changing configurations / set-ups
- Verify electrical / software functions perform in conjunction with each other

Test Program

- **Environmental test performed in accordance with GEVS and mission specific requirements:**
  - **Vibration**
  - **EMI/EMC**
  - **Thermal Vacuum**
  - **Thermal Balance**
  - **Bake Out**
  - **Special Test**
- **End-to-End testing**
- **Failure-free hours of operation achieved (including thermal)**
- **Failures are properly identified and fully disposition prior to proceeding to breaking/changing configuration or proceeding to the next level**
- **Verification / Validation Plan and Matrix**
  - **Full data review at completion of test program by review team**
    - **Will complete subsystem Certificate of Acceptance Form**